

BIOMETHANE FICHE – Slovenia (2021)

BIOMETHANE PRODUCTION, POTENTIALS AND PATHWAYS

Biomethane is upgraded (purified) biogas to the quality of natural gas (methane). Currently, biogas is dominantly used to produce electricity and heat in CHP plants.

Biogas/biomethane is 100% of domestic origin and has cross-sectoral effects.

Upgrading of biogas in the EU started in 2011. In 2021, total biomethane production in the EU27 was 3.5 bcm. REPowerEU has biomethane as one of the short and medium-time measures to reduce natural gas imports by boosting biomethane production to 35 bcm by 2030.

BIOGAS / BIOMETHANE IN SLOVENIA (DATA FROM 2021)

- Energy balances (Eurostat) record production of 0.03 bcm of biogases, without distinguishing the type.
- Biogases make 3.2% of gas supply.
- 0.03 bcm of biogas / biomethane are used to produce electricity, either in electricity only or CHP plants (89%), followed by commercial & public services (9%) and industry (2%) as Final energy consumption consumers.
- Biomethane in transport is not recorded in Energy balances.
- European Biogas Association (EBA) reports¹ 0.02 bcm of biogas produced in 2021 (100% in 24 biogas plants). There are no biomethane plants installed in Slovenia yet, as there is no sufficient legal and regulatory framework for its production and use.
- CNG Europe reports² 6 CNG stations for Slovenia, out of 3,769 in the EU27, in 2022.

¹ [EBA Statistical Report 2022 | European Biogas Association](#)

² [CNG Europe | Map of Natural Gas Vehicle \(NVG\) Compressed natural gas \(CNG\) filling stations in Europe, Mappa Stazioni di rifornimento di metano, Landkarten Methantankstellen erdgastankstellen](#)

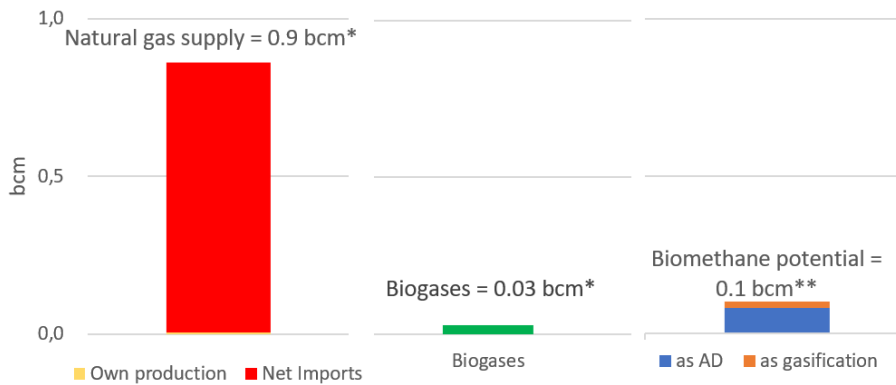
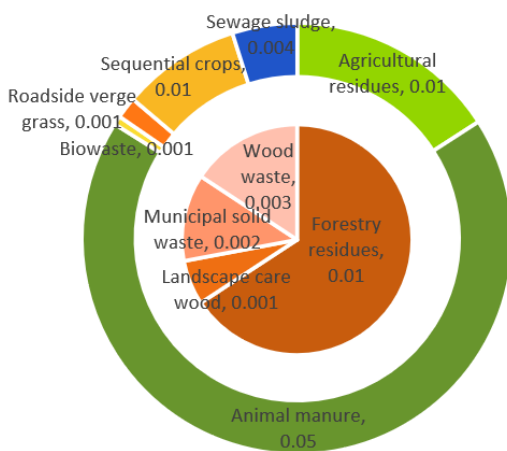


Figure 1 Comparison of current natural gas supply, biomethane production and potential in Slovenia (2021) (sources: Eurostat: Energy Balances, 2022*; Guidehouse: Gas for Climate Report 2022**)

Biomethane has two production pathways:

- **Anaerobic digestion (AD)** produces biogas and digestate (fermented organic matter, similar to slurry) as a local source of nutrients and GHG emission mitigation option for land management.
 - Macro and micro nutrient composition of digestate depends on the feedstock used for AD³
 - Digestate contains phosphorus (0.2-1.5 kg/t) that is on the list of critical raw materials for the EU⁴.
- **Gasification** produces biogas and biochar (carbonized organic matter, similar to charcoal) as a land-based carbon removal option (IPCC, 2019) and soil amendment.

To maximize the multisectoral value of biomethane, byproducts must be recognized and valorized.



Industry estimates Slovenia's potential as 0.1 bcm (0.1 bcm from AD and 0 bcm from gasification) by 2030 (Figure 2).

Considering the sustainable potential, Slovenia is small biomethane market among the EU27 but with great national benefits.

Slovenia consumes 28 kt and 4 kt of nitrogen and phosphorus fertiliser⁵ that could be partially replaced by digestate.

Electricity, gas, steam and air conditioning is the single largest GHG emission source by economic activity with 34% (4.3 MtCO_{2eq})⁶ in Slovenia, which can be tackled by boosting biomethane production.

Figure 2 Biogas/biomethane potential in bcm, by feedstock for Slovenia (inner pie gasification and outer circle AD) (source: Guidehouse: Gas for Climate Report, 2022)

About 4% (~15.8 bcm) of the total natural gas supply in EU was used for non-energy purposes, dominantly for synthesizing nitrogen-based fertilizers, in addition to the energy input needed to support the production process. Combining biomethane production with a strong support of using digestate as a local source of nutrients would have multiple benefits for the reduction of natural gas imports.

³ As a rule of thumb, 1 ton of digestate contains 2.3-4.2 kg of N; 0.2-1.5 kg of P and 1.3-5.2 kg of K.

⁴ [EUR-Lex - 52023PC0160 - EN - EUR-Lex \(europa.eu\)](https://eur-lex.europa.eu/eur-lex.do?uri=CELEX:52023PC0160-EN)

⁵ https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Agri-environmental_indicator_-_mineral_fertiliser_consumption#Analysis_at_country_level

⁶ [File:Greenhouse gas emissions by economic activity, 2021 \(thousand tonnes of CO2 equivalents\).png - Statistics Explained \(europa.eu\)](https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Greenhouse_gas_emissions_by_economic_activity,_2021_(thousand_tonnes_of_CO2_equivalents).png_-_Statistics_Explained_(europa.eu))

NATURAL GAS (NG) SUPPLY AND CONSUMPTION OF SLOVENIA (2021)

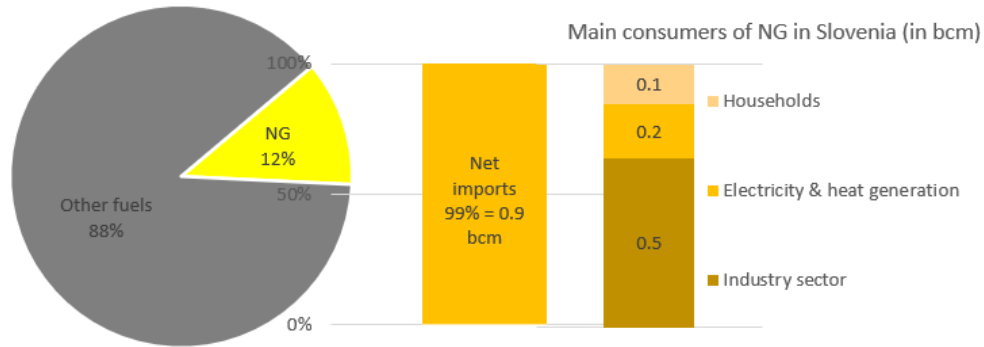


Figure 3 Natural gas share in total energy supply, origin and main consumers for Slovenia (2021) (source: Eurostat: Energy Balances, 2022)

- NG makes 12% of the total energy supply (TES) of Slovenia, out of which 99% (0.9 bcm) is imported.
- NG is used 99% for energy purposes and 1% for non-energy purposes (synthetic fertilizers).
- The main NG consumption sectors in Slovenia are industry (62%), followed by electricity production (20%) and households (15%).

Key messages for biomethane in Slovenia:

- Slovenia has ability to replace about 12% of the current NG consumption (imports) with biomethane.
- Slovenia currently deploys about 30% of its sustainable biomethane potential.
- The existing number of CNG filling stations is allowing supply of biomethane to transport.
- Full effect of biomethane in the green transition would be framing support schemes around livestock and meat and dairy industry to reduce carbon footprint of meat and dairy products as well as GHG emissions from agriculture.
- Well-developed natural gas grid gives an advantage to inject biomethane in the grid, with several small ADs clustered around one biomethane upgrading unit.
- A programme to repower biogas CHP plants to biomethane, either as a single upgrading point or a cluster with a centralized upgrading unit close to a NG pipeline injection and industry use (ETS sector).
- It would be good to combine biomethane production with sequential cropping and digestate use to store carbon in the soil and feedstock (like the BiogasDoneRight concept in Italy) and biogenic CO₂ use in agri-food production.